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METHOD FOR MANUFACTURING A SURFACE-ALLOYED CYLINDRICAL,  
PARTLY CYLINDRICAL OR HOLLOW CYLINDRICAL STRUCTURAL  
MEMBER AND DEVICE FOR IMPLEMENTING THE METHOD

SUMMARY

The invention relates to a method for manufacturing a surface-alloyed cylindrical, partly cylindrical or hollow cylindrical structural member where in the zone of incidence of the energy beam there is formed a locally bounded melting bath with a heating and melting front, a solution zone and a solidification front. At the side of the energy beam the hard material powder is deposited via a conveyor device in the direction of gravity and is supplied co-ordinated with the feed movement of the workpiece in a width which corresponds to the width of the linear focus and a layer height of 0.3 - 3 mm is thereby produced. The hard-material powder supplied to the workpiece surface in the heating front of the melting bath is heated by an energy beam at a wavelength of 780 - 940 nm and in contact with the liquefied matrix alloy the powder is immediately dissolved in the melting bath. Convection is produced in the solution zone by the energy beam having a specific power of at least  $10^4$  W/cm<sup>2</sup>, so that the homogenisation process in the melting zone is accelerated, where the linear focus acts on the solution zone until the hard material powder is uniformly distributed in the melting bath. In front of the energy beam the uniformly distributed powder material, which has gone into solution metallurgically in the solution zone, is subjected to directional solidification in the

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solidification front at a high cooling rate of 200 - 600 K/s at a feed rate of 500 - 10,000 mm/min. The invention also relates to a device for implementing the method, consisting of a workpiece clamping device, on which a workpiece is aligned and clamped above index holes and/or above working surfaces, onto whose surface a powder supply and a focusable beam from a beam head are directed.

Figure 1